

Introduction

Chairman's Introduction

Samuel Krinsky

Interim Chairman of the National Synchrotron Light Source

The year 2000 has been a very active and productive one at the NSLS. During this period, the facility has successfully provided beam at the highest levels of reliability and stability for over 2500 researchers carrying out experiments in the life, materials, chemical and environmental sciences, and technology. One highlight of the experimental program was the successful determination of the complex structure of the human ribosome using x-ray diffraction techniques. Another high-impact result came from an experimental investigation of high- T_c superconductors, which showed that the "Fermi Liquid" model that so well describes normal superconductors is not operative in high- T_c materials. Important research examining magnetic multi-layers with elemental specificity and high sensitivity was carried out on the giant and colossal magneto-resistive materials, which show promise as the basis for the next generation magnetic storage devices for computers. The infrared microscopy program has been rapidly expanding, and noteworthy results were obtained from investigations of the chemical basis for bone diseases such as osteoarthritis and osteoporosis.

The upgrade of beamlines on the VUV-ring has resulted in a revitalization of the user program. During the upgrade, 6 new IR beamlines and 4 upgraded soft x-ray beamlines were brought into operation, and a new 5-30 eV beamline was established at U13. These innovations have produced new state-of-the-art capabilities and have enhanced the scientific program as evidenced by increasing numbers of users and publications.

There is now an initiative to improve the insertion device beamlines on the X-ray ring. A new high-resolution monochromator and elaborate sample chamber have been procured for the soft x-ray undulator beamline X1B. The superconducting wiggler beamlines at X17 are being reconfigured to increase the experimental throughput. On X21, photon beam transport is being provided to bring x-rays into the back hut to establish a new end station for materials science. On X25, a new cryogenically cooled monochromator and

a state-of-the-art 9-cell CCD detector have been purchased. In addition, we are building new in-vacuum undulators to be installed in the RF straight-sections at X29 and X9, increasing the number of insertion devices on the X-ray ring to eight.

In the life sciences, a consortium of protein crystallography beamlines has been formed with NIH funding. The result has been a major increase of user support in this area and a dramatic increase in productivity. This suggests that consortia should be developed targeting other scientific disciplines. If funding can be acquired, the advantages of coordinating the activities of groups of beamlines and providing enhanced user support could have a very positive impact on the experimental program.

In the area of novel source development, the high-gain harmonic-generation (HGHG) experiment at the BNL Accelerator Test Facility (ATF) successfully demonstrated the proof-of-principle for a new approach to free-electron lasers. In HGHG, a seed laser imposes a coherent density modulation on an electron beam. When this bunched electron beam passes through a long undulator magnet, coherent radiation is produced at harmonics of the seed laser. The high peak power output is both spatially and temporally coherent. It is planned to extend the success achieved at the ATF in the infrared to shorter wavelengths at the Deep Ultraviolet Free Electron Laser (DUV-FEL) now being installed in building 729 adjacent to the NSLS.

A very exciting subject of R&D at the NSLS is the possibility of a future upgrade to the facility utilizing a Photo-injected Energy Recovery Linac (PERL). At the present time, most synchrotron radiation research is carried out on electron storage rings. In such devices, the electron beam's transverse emittance, bunch length and energy spread are determined by an equilibrium between the quantum fluctuations arising due to the emission of discrete photons and the damping resulting from the average energy loss. Storage ring sources have been optimized in recent years to provide high

brightness, stability and reliability. It is now a good time to consider what type of accelerator future synchrotron radiation sources should be based upon. One apparent limitation of storage ring sources is that no practical scheme has been put forward to provide very short electron bunches with duration below a few ps. It is known that short electron bunches of duration down to 100 fs can be obtained using linear accelerators.

Linear accelerators are quite widely used as drivers of free electron lasers because of the high peak currents and small emittances that are achievable. In the last few years several research groups have been considering the potential of using linac sources for providing incoherent synchrotron radiation. One reason this

is not commonly done is that achieving high average currents, on the order of a few hundred mA, has been common place in storage rings but has not yet been achieved in linacs. Recent developments at Thomas Jefferson National Accelerator Facility have made it seem much more likely that average currents of a few hundred mA can be achieved in linacs with energy recovery. The result is that PERLs have the potential to provide electron beams of 3-6 GeV, with average currents of 100 mA, emittances on the order of 0.1 nm-rad and bunch lengths of 100 fs. Therefore, PERLs offer a very attractive basis for the next generation of synchrotron radiation sources at BNL.



User Administration Report

Mary Anne Corwin
User Administrator

So, what's new in User Administration? Quite a bit. Many changes in staffing, office configuration, and electronic office automation have taken place this past year and several other changes related to training and guest services are in progress.

Staffing

User Administration staffing took on significant changes this year with Linda Feierabend moving over to a new position at Physics and Eileen Pinkston retiring after 20 years at the lab. We all wish Linda and Eileen well in their new endeavors.

In October, Gretchen Cisco joined our staff having provided administrative support to the Reactor Division and to the Department of Energy Brookhaven Group while working for DOE contractors prior to her arrival. Wendy Spaeth is new to the laboratory and joined our staff in December.

The new staffing changes provided an opportunity to increase productivity and improve services by reorganizing the functions and responsibilities within the office. In Lydia Roger's new role as Deputy User Administrator, she supervises and trains other staff, coordinates the annual Users' Meeting and the Users' Executive Committee and Town Meetings, and will be working directly with PRTs concerning progress reports,

agreements, MOUs and tenure reviews. She will continue to hold the anchor role for the abstract system.

Nancye Wright continues to be an integral and important asset as Production Assistant and primary contact for the Activity Report, publication references, the NSLS Newsletter, the Community Directory, and the Operations Directory. Nancye is also the Users' Meeting Vendor and Exhibit Coordinator.

Gretchen has a very important role as General User Proposal Program Coordinator, working with users, PRT members, the Proposal Study Panel and the Allocation Committee to manage the proposal program. She also serves as primary contact for proprietary use of the NSLS, email lists and summer housing for users.

Wendy's position was modified to better serve users and to provide more continuity and less interruption throughout the office. Her principal role is to assist users in user appointments, registration, training, badging and user agreements. She maintains the BLOSA and Safety Approval Form data. Her accounting background will benefit the office in generation of reports.

Office Renovation and Training

Another significant change has been the office renovation that took place during this winter's shutdown.

Oddly, several staff members and users have commented, "So, what's changed?" While it may appear at first glance that little has changed, a very important goal was achieved—the training room is considerably larger and will now accommodate eight users for registration and training. Training will no longer be accomplished by viewing a video and reading the Users' Guide. All training is PC-based (mainly web). Several other modifications were made to increase functionality of the office.

On the subject of training and the Users' Guide, Section 6 of the Users' Guide will be removed. The official training documentation will be contained on the web. One final anticipated goal for training this year is to open it to offsite web access.



Office Openings and Closures

To improve the efficiency of our office and to remove some of the burden on the Operations Coordinators, the User Administration office will be staffed on those holidays on which we are in operations (Martin Luther King Jr. Day, Presidents' Day and Veterans Day). To improve user services, the User Administration office will close each Wednesday (except during weeks when operations begin on Wednesday or Thursday) from 2:00 to 2:30 for a staff meeting.

NSLS Website and Office Automation

The NSLS website took on a new look this year, a new home page and a new web address. Be sure to bookmark our new site at nslsweb.nsls.bnl.gov. Most of the files have been moved from our older server to the new one. This project is near completion.

The new server and software have given us capabilities only previously available by hiring a consultant or through BSD. It is now possible to create online forms with many applications. Electronic office automation in the User Administration office continues to move forward. Online submissions forms were completed and put into production for publications references and abstracts. The new abstract system now uses Word and is much more simple to use.

With the new move to the PC-based webserver, each beamline has been given a website of their own so that information about the beamline can be main-

NSLS User Administration Office Staff. Top row (left to right): Gretchen Cisco, Mary Anne Corwin, Lydia Rogers. Bottom row (left to right): Nancye Wright and Wendy Spaeth.

tained more effectively. Completion of the beamline web project will take place midyear.

BNL has implemented a new guest information database which will allow users to register for their appointment online, offsite. Though the NSLS has had its own database for nearly a decade, we have been asked to link up to BNL's database. Our database, however, has considerable Light Source specific information and the link up is not quite so simple. The initial framework has been completed and we anticipate to be operational by the time of this publication.

FTP Site

A FTP site has been set up for users to transfer research data files back to their institution that were created while performing experiments here at the NSLS. No special access is needed for this FTP site; you log on anonymously. Parameters on the FTP site are: Users can copy onto and copy off of the FTP site but cannot delete files. They will be automatically deleted at the expiration of 72 hours. For more information, speak with a beamline staff member or contact NSLS User Administration.

Facility Report

Frank Terrano

Assistant to NSLS Chairman

Changes in Building Management

Mike Kelly, whom many of our Users have known as the NSLS Building Manager for the last eight years has retired this past September. Mike became Building Manager when the position was first established back in 1992, and played a significant part in the evolution of the roles and responsibilities of this position into what they have become today. In his concurrent role for the past two years, as (again the first) Work Planning Manager at the NSLS, Mike was also a key player in the development our Work Planning process, which served as a pilot program for the subsequent BNL system. Mike was clearly not afraid to take on new challenges and always made significant contributions. We thank Mike for his many years of dedicated service to the Department and wish him well in his new life.

We have been very pleased to welcome Gerry Van Derlaske into both of his new roles as NSLS Building Manager and NSLS Work Planning Manager. Gerry has done an exemplary job over the previous two years in his service to the Department as Assistant Building Manager, and a great many of our Users know Gerry from his position for many years as manager of the User machine shop. We have also been fortunate in getting Robert Kiss into the Department to take over the management of the User machine shop and serve as Assistant Building Manager. Bob has brought with him a broad range of expertise, particularly his knowledge of safety issues, policies and procedures from his previous position as Reactor Maintenance Supervisor with BNL's Reactor Division.

New General User Lab

In response to the growing demand for laboratory facilities on the experimental floor at the NSLS, construction of a new General User Laboratory in room 1-110 began in the early fall of 2000. Equipped with standard lab furnishings, including fume hood, sinks and de-ionized water, the new laboratory is slated for completion around January 2001. Room 1-110, which

was previously used for short term storage, is located in the northeast corner of the experimental floor, adjacent to the NSLS Library/User Lounge. This will bring the total up to five General User labs available to our research community in Building #725.

Sound Abatement

As part of our ongoing sound abatement effort, over the past year we have installed some 550 sound absorption panels throughout the X-ray and VUV experimental areas. Panels have been affixed to sawtooth walls and outer walls behind the beamlines as well as atop and below the cable trays radiating out from the rings between the beamlines. They have also been attached to hutches and wherever else we found large flat sound reflective surfaces. Approximately fifty remaining panels have been earmarked for installation around the newly renovated hutches in the X6-A&B and X20-A/B/C areas. User feedback has been quite positive thus far, and we will continue our efforts wherever we determine improvements can be achieved.

Credit Cards for Users

During the past year the "Electronic Mall" was established at BNL to provide an on-line vendor to carry stationary items, which had been discontinued in BNL's central stockroom. On-line vendors for electronics are slated to follow shortly. In response to NSLS User requests, BNL began issuing credit cards to Users, to allow for ordering stationary via on-line catalogs, as well as other materials directly from vendors. The process generally takes only a few days to get a credit card, after completing the mandatory training that all credit card holders are required to have. Users wishing to have a BNL credit card must have an established account at BNL, before a card can be issued. BNL credit cards are required in order to use the new on-line catalogs, however, Users with credit cards from their home institutions may still continue to make direct purchases with outside vendors, on their own cards, as before.

ESH&Q Report

Bob Casey

Associate Chair for Environmental, Safety, Health and Quality

Environment, safety and health programs at NSLS and Brookhaven National Laboratory continued to receive major emphasis during the fiscal year. A major 2

week review of the ESH program at BNL, including the NSLS, was conducted in April, 2000. Many staff members and some members of the user community were

interviewed, and a detailed examination of the experimental safety review program was conducted. No deficiencies in the ESH program were called out. A number of other audits were conducted by internal and external organizations during the year. The NSLS has fared well in all reviews.

Besides faring well in audits, the ESH performance within the on-going work is doing very well statistically. As an example:

- The total whole body radiation exposure (gamma + neutron) to all personnel working at NSLS in Calendar year 99 was 140 mrem. Of 7082 badges worn and processed during the year, only 23 (0.32%) had a recordable whole body dose.

- One recordable (as determined by OSHA criteria) injury was experienced at NSLS in FY 2000. No injuries were experienced among the user community.

- No spills or releases to the environment occurred as the result of NSLS activities.

- The generation of hazardous and industrial waste associated with the experimental program declined for the fourth year in a row. The total amount of hazardous/industrial wastes in FY 2000 was 800 pounds, compared to almost 1800 pounds in FY 97.

- Beam line operational and safety training (BLOSA) has received considerable attention in the past year and the implementation rate is very high.

Because of the effort of the many people, the NSLS is a safe place to work. I want to acknowledge the on-going commitment and dedication of the NSLS management and staff, and that of our user community. A pat on the back is due to everyone involved.

I want to provide special acknowledgment to the ESH/Q staff who work so hard to help keep the NSLS a safe place. Without their commitment to the NSLS, the program would not be nearly as effective as it is. It is a pleasure to work with:

Tom Dickinson (Safety Officer), Nick Gmur (ESH Coordinator), Andrew Ackerman (Experimental Review and Industrial Hygienist), John Aloï (Safety Engineer), Mike Buckley (QA Rep), and Charlotte Wrigley (Quality Control Coordinator). I also want to acknowledge the fine support we received from the Laboratory's ESH/Q Directorate - Chris Weilandics, Rudy Zantopp, Marlon McAvoy, and Deborah Bauer.

FY 2001 ESH Objectives

The over-arching ESH performance objective for NSLS in FY 2001 is to maintain operational excellence in ESH and waste management. To achieve that ob-

jective, a number of specific areas have been identified for particular emphasis during the year:

1. Maintain effective work planning and experimental review, and ensure compliance with applicable BNL requirements - reviews will be conducted during the year to assess performance in these areas.

2. Evaluate a number of previously identified pollution prevention/waste minimization opportunities to determine if the opportunities are feasible and cost effective.

3. Achieve compliance with ISO 14001 criteria for the environmental and waste management programs at NSLS. This is a part of a Laboratory wide commitment which culminates with a site registration review in the Spring 2001 by an independent registrar.

4. Upgrade NSLS Safety and Environmental Assessment Documents to address current BNL and DOE requirements. (These documents constitute the basis for NSLS operation and establish the overall safety envelope for the NSLS programs. This will be the first year of a several year effort.)

My belief is that most of these activities will be totally transparent to our user community as long as the current basic program elements are maintained by each user:

- Make sure that your safety approval forms are submitted in a timely and complete manner.

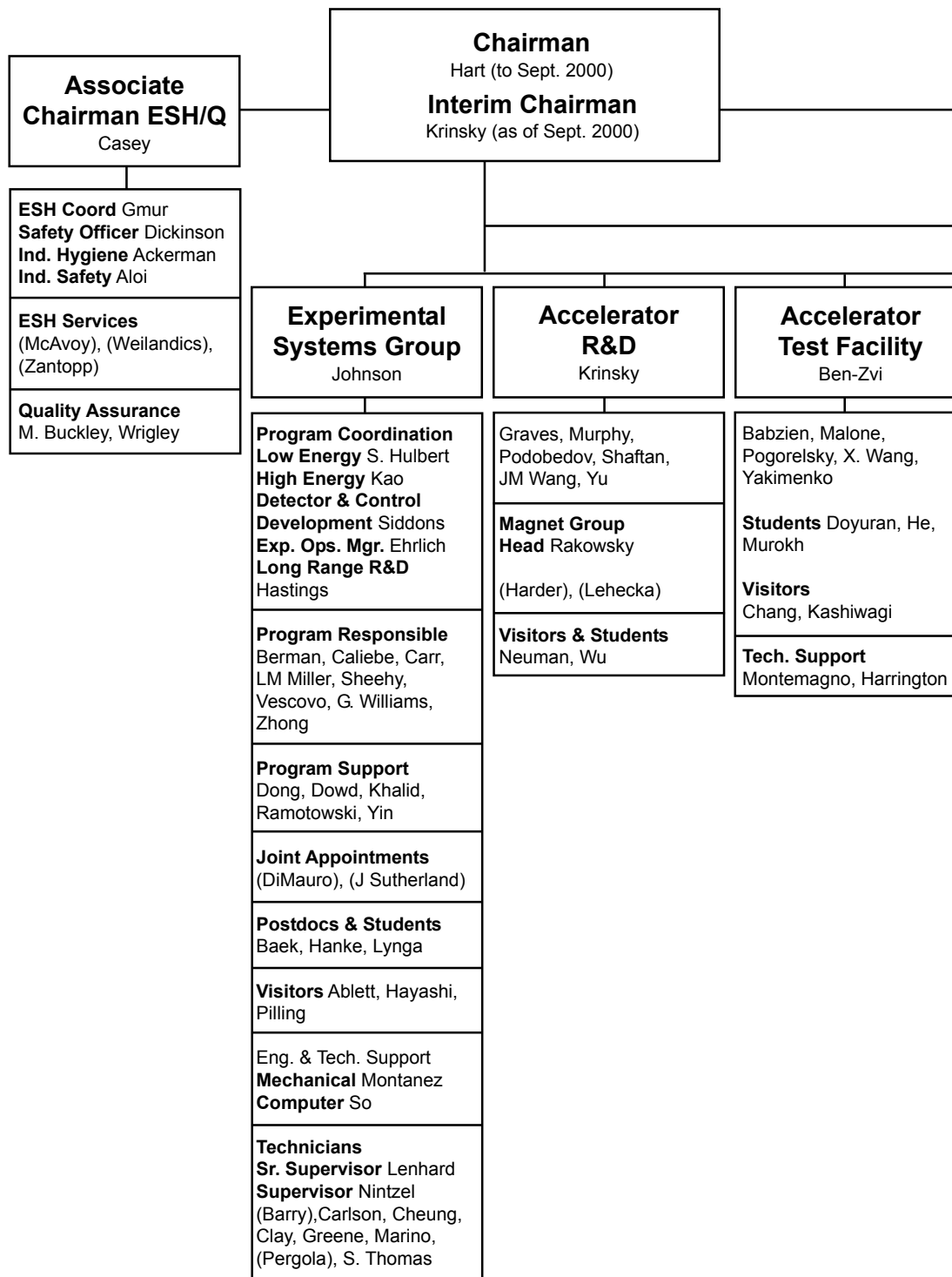
- Ensure that all necessary training is completed for the activities that you perform - keep in mind that there is specific additional training required if you generate hazardous wastes, if you operate a laser, or if you need to operate material handling equipment such as a hoist.

- Ensure that any conditions required in the safety review are understood by all members of the experimental team and are adhered to throughout the experiment.

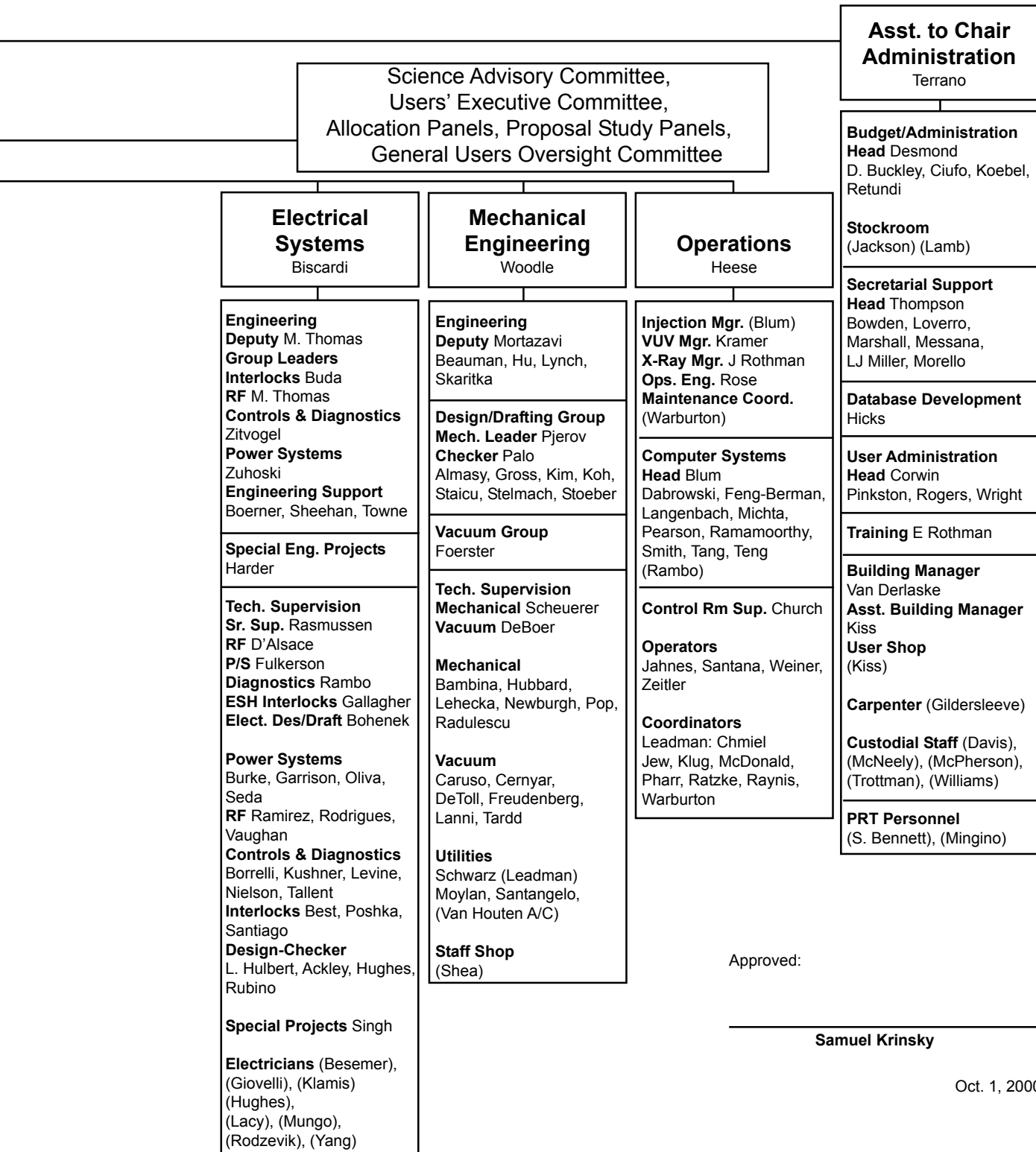
- Minimize the amount of chemicals that are used in your experiment and ensure that they are safely and legally transported to and from the NSLS and your home institution.

We have an excellent safety record. However, we always must keep in mind that there is the potential in our work to do harm to individuals or the environment - planning, identification and control of hazards, and adherence to requirements are the key to a successful program. Let's always keep that in mind during FY 2001.

National Synchrotron



Light Source Staff



Approved:

Samuel Krinsky

Oct. 1, 2000

National Synchrotron Light Source

1999-2000 Users' Executive Committee

The Users' Executive Committee (UEC) provides for organized discussions among the user community, NSLS administration, and laboratory directorate. It aims to communicate current and future needs, concerns, trends within the user community to NSLS staff and management, and to disseminate to the users information about NSLS and BNL plans.

Chair

Mark Chance

Albert Einstein College of Medicine

Vice-Chair

Simon Bare

UOP

Member

Kenneth Evans-Lutterodt

Lucent Technologies

Member

Leemore Joshua-Torr

Cold Spring Harbor Laboratory

Ex-Officio Member

Mary Anne Corwin

NSLS User Administrator

Past Chair

Barbara Illman

USDA/FS Forest Products Lab, U. of Wisconsin

Member

Michael Vaughan

SUNY @ Stony Brook

Secretary

David Mullins

Oak Ridge National Laboratory

Member

Chris Jacobsen

SUNY @ Stony Brook

Member

Zbigniew Dauter

Science Applications Int'l Corp.

Ex-Officio Member

Erik Johnson

mline Support, R&D Head

Special Interest Group Representatives

Special Interest Groups in areas of common concern communicate with NSLS management through the UEC.

Biology/Crystal.

Imaging

Industry

Infrared

Nuclear

Scattering

Timing

Topography

UV Photo Emission

XAFS

Zbigniew Dauter, SAIC

Antonio Lanzirotti, U. of Chicago

Simon Bare, UOP

Lisa Miller, BNL/NSLS

Mark Lucas, Ohio University

Michael Vaughan, SUNY @ Stony Brook

Larry Carr, BNL/NSLS

Michael Dudley, SUNY @ Stony Brook

David Mullins, Oak Ridge National Lab

Kumi Pandya, North Carolina State U.

Advisory Committees

General User Proposal Study Panel

The Proposal Study Panel (PSP) reviews and rates General User Proposals. Members are drawn from the scientific community and generally serve a three-year term.

VUV Panel

Daniel Fischer, NIST
Fredrich Hoffman, Sci-Med
Laszlo Mihaly, SUNY @ SB

X-Ray Biology

Steven Almo, AECOM
Fred Dyda, NIH
Tom Ellenberger, Harvard Med.
Leemor Joshua-Torr, Cold Spr.

X-Ray Imaging

Antonio Lanzirotti, U. of Chicago
Carl Zimba, MIT

X-Ray Spectroscopy

Lars Furenlid, BNL/NSLS
Ken Miyano, Brooklyn Coll.
Robert Scarrow, Haverford Coll.

X-Ray Scattering

Slate Cargill, Lehigh U.
Ben Hsiao, SUNY @ SB
Ronald Pindak, Lucent Tech.

Allocation Panel

The Allocation Panel allocates General User beam time to both new proposals and Beam Time Requests based on ratings provided by the Proposal Study Panels. Members are drawn from the scientific community and generally serve a two-year term.

VUV

Paul Stevens, Exxon
Elio Vescovo, BNL/NSLS

X-Ray

Malcolm Capel, BNL/Biology
Mark Chance, Albert Einstein College of Medicine
John Hill, BNL/Physics
Jean Jordan-Sweet, IBM
Syed Khalid, BNL/NSLS
Craig Ogata, HHMI

General User Oversight Committee

The General User Oversight Committee resolves disputes between General Users, PRTs, and NSLS staff.

Simon Bare
University of Pennsylvania

Mark Chance
Albert Einstein College of Medicine

Dale Sayers
North Carolina State University

Barbara Illman
USDA/FS Forest Products Lab,
U. of Wisconsin

Science Advisory Committee

The Science Advisory committee (SAC) evaluates science programs at the NSLS and makes recommendations to the Chairman.

Martin Blume, BNL
Stephen Burley, Rockefeller U.
Sol Gruner, CHESS/Cornell U.
Franz Himpsel, U. of Wisc.
Keith Hodgson, SLAC
Jochen Schneider, HASYLAB/DESY
Albert J. Sievers, Cornell U.

Sunil Sinha, APS/ANL
Sam Krinsky, BNL/NSLS
John Marburger, BNL
Rick Osgood, Jr., BNL
Mark Chance, AECOM
Peter Paul, BNL